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Article

New Levels of Climate Adaptation Policy: Analyzing the Institutional Interplay in the Baltic Sea Region

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Abstract: International policy development and expected climate change impacts such as flooding, landslides, and the extinction of sensitive species have forced countries around the Baltic Sea to begin working on national climate adaptation policies. Simultaneously, the EU is building both a central and a macro-regional Baltic Sea-wide adaptation strategy to support national policy developments. However, it yet remains unclear how these EU strategies will complement each other or national policies. This article analyzes the constraints and opportunities presented by this new institutional interplay and discusses the potential of the forthcoming EU strategies to support national policy. It does so by mapping how adaptation is institutionalized in two case countries, Sweden and Finland, and is organized in the two EU approaches. The vertical institutional interplay between scales is analyzed in terms of three factors: competence, capacity, and compatibility. Results indicate institutional constraints related to: risks of policy complexity for sub-national actors, an unclear relationship between the two EU approaches, an overly general approach to targeting contextualized climate change vulnerabilities, and a general lack of strategies to steer adaptation. However, there are also opportunities linked to an anticipated increased commitment to the national management of adaptation, especially related to biodiversity issues.

Keywords: adaptation; Baltic Sea Region; climate change; EU; institutional interplay

1. Introduction

Assessments of climate variability in the Baltic Sea Region (BSR) over the last fifty years have indicated trends towards higher sea water temperatures, decreasing ice cover, and increased precipitation in an already sensitive ecosystem [1]. Climate change scenarios for the same region suggest similar but intensified trends, leading to increased future risks of flooding, landslides, extinction of sensitive species, *etc*. [2]. Adaptation strategies, aiming at reducing vulnerability or exploiting new opportunities, are presented to provide guidance on how to minimize such negative socio–ecological impacts since climate change effects now are inevitable even if ambitious mitigation targets are implemented [2]. Thus, adaptation is argued to be necessary in order to increase sustainability, both by regulating the management of direct societal threats to our built environment or agricultural and forest production, and by giving directions on how to manage indirect threats on ecosystems in form of decreased biodiversity and intuition of alien species [3–5].

Adaptation is a context specific policy problem with climate impacts affecting countries and localities in different ways, depending on their vulnerability and ability to adapt. Thus much of the adaptation action needs to take place locally, although coordination across levels of decision-making is necessary. Currently, to manage such threats all BSR nations are, to varying degrees, developing and implementing climate adaptation as part of their national, regional, and local climate policies. Yet, however, attached policy instruments such as laws, regulations and other legislative, economic and institutional mechanisms are generally rather under developed within national management [6]. Therefore how to organize or steer national adaptation to build more substantiated adaptation decisions are a current challenge facing the BSR nations.

Parallel to these national developments, the European Union (EU) is developing two overarching strategies that will contribute to a more comprehensive adaptation framework in Europe. Both initiatives target the BSR by creating two adaptation strategies that cover the BSR, a central European and a macro-regional one. Work on the central strategy is guided by the 2009 white paper on adaptation, while work on the macro-regional strategy is managed under the EU Strategy for the Baltic Sea Region. However, it is still unclear how these two EU strategies are to support and complement each other or the national approaches, despite the aim of implementing the central strategy as early as 2013. This lack of clarity risks reducing the strategies' usefulness [7].

This study analyzes constraints to and opportunities for building a functional institutional interplay of climate adaptation policy between the supra-national and national levels in the BSR. The study first maps the planned organization of adaptation including policies and measures in the two above mentioned EU adaptation strategies. This is used as a starting point for analyzing how well this fits with the current institutionalization of adaptation in two case countries, i.e., Sweden and Finland. Institutionalization of adaptation is in this article defined as the process of incorporating the issue of adaptation to climate change into the formal structures and rules on various levels of government. The case countries were chosen because, while they are fairly similar in certain respects, they have

officially taken relatively different approaches to institutionalizing adaptation. *First*, both countries are located in the Baltic Sea Region. *Second*, they have similar regulatory systems following the "Nordic autonomy model," meaning a high degree of municipal self-governance. *Third*, they are comparable in terms of overall economic conditions, access to technology, infrastructure, and social equity, all of which are considered key determinants of a nation's capacity to adapt to climate change [8,9]

These similarities make it possible to analyze the importance of national institutionalization of climate adaptation as a parameter for building a functional European institutional interplay, without including other determinants in the analysis. The study has been guided by the following two research questions:

- What priorities have been made for adaptation within the studied national and EU-level adaptation policies?
- In what ways will the two EU approaches be able to complement national adaptation developments in the two case countries?

These research questions help to clarify the emerging European governance framework for adaptation. The article is structured as follows. Section 2 presents the theoretical basis for analysis and introduces the methodological approaches used here, *i.e.*, document analysis and group interview. Section three presents the results of mapping the institutionalization of climate adaptation in the two EU approaches. Section 4 presents the results of mapping the institutionalization of adaptation in the two case countries and discusses constraints to and opportunities for building a functional institutional interplay of adaptation policies. Section 5 presents the conclusions of the study.

2. Framework and Methodology for Analysis

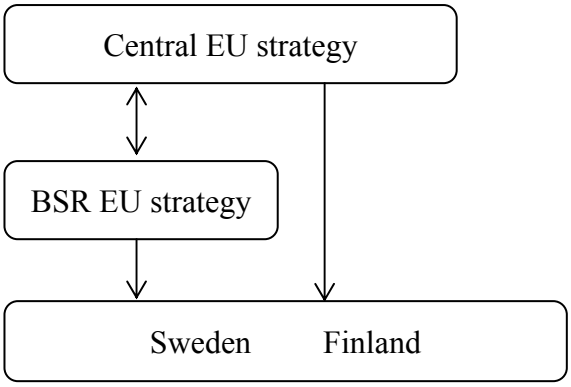
The key role of institutional structures in determining environmental outcomes is well established (e.g., [10–12]). In the specific context of this study, the institutionalization of climate adaptation has been explained as crucial to a country's capacity to adapt to climate change since it provides a structure for adaptation work [13–17]. From this perspective, to institutionalize adaptation is the process of incorporating adaptive concerns into a nation's official political and administrative regulatory infrastructure guiding societal actors' behaviors regarding specific issues [18]. Institutionalization includes setting up systems and criteria's for how to organize adaptation, such as allocation of roles, responsibilities, resources and goals. Therefore, more specified structures for organizing adaptation nationally mean a higher degree of institutionalization of adaptation [19].

Although institutionalization may facilitate work on a specific issue by providing a clearer structure, it also implies inflexibility. This inflexibility can make transnational cooperation problematic if the institutional structure is not compatible with the structure of adaptation in countries that are potential cooperation partners [20]. Such policy compatibility has been explained as crucial when formulating supra-national strategies concerning complex trans-boundary issues, such as climate change adaptation, that demand a certain degree of goal alignment [21–24].

Betsill and Bulkeley [25] argue that climate adaptation management may become fragmented when the "institutional makeup" at lower governmental levels is not compatible with the direction identified in the overarching strategies. Following this logic, it has further been widely accepted that it is

important to bridge institutional structures across scales to build a functional institutional interplay capable of managing shared issues [26–30]. This calls for harmonization between scales in developing a new institutional interplay, in this case, between the central EU level, the macro-regional EU level, and the two cases countries, so as to avoid confusion and create a supporting structure that facilitates national implementation. As mentioned in the introduction, this study discusses the constraints and opportunities presented by this new vertical institutional interplay, as seen in Figure 1.

Figure 1. Vertical institutional interplay.



Institutional interplay, a concept introduced by Oran R. Young, is defined as the "the relationship of an institution to and interactions with one or more other institutions" [31]. Much of Young's work focuses on international regimes that interact with each at the global level but the concept of vertical interplay enables one to extend the analysis across levels of decision-making [31]. By vertical interplay, Young refers to the interaction between or among regimes located at higher and lower levels on the jurisdictional scale [11]. This framework enables a starting point for the analysis by acknowledging that steering in relation to public policy increasingly originates from multiple levels of decision-making, i.e. outside the nation state and from the EU level in Europe. The concept of interplay has been further extended to analyze the EU, for example. Within Europe, several hundred environmental legal instruments, primarily directives and regulations, have been developed, presenting making the EU a good case study within which to examine the interplay between institutions [34], In this article, three factors of this institutional interplay considered central to the analysis, *i.e.*, competence, capacity, and compatibility, are used to assess the interplay between different institutional levels.

The first factor, *competence*, is defined as the availability of both the political and legal authority necessary for making decisions leading to the implementation of higher level policies [20]. In the context of the present study, in which the focus is primarily on the official political system and its institutional structure, this factor relates to the division among various levels of legal authority for making climate adaptation decisions. One example is the allocation of authority between authorities at the national and sub-national levels. Here, for example, a mismatch can occur if a supra-national authority attempts to steer policy on issues on which it has not power over, *i.e.*, land use in the case of local planning monopoly. In the mapping of institutionalization of adaptation the landscape of authority for adaptation is analyzed at the supra-national and national scale. In the interplay analysis, the match between these distributions of authority across scales is analyzed to discern what implications this has for building supporting supra-national strategies. A too diverse, and not

sufficiently defined, division of authority at different scales can be considered to be an obstacle for building capacity to manage climate change vulnerability [32].

The second factor, *capacity*, is defined as the availability of the material and institutional resources necessary for successfully implementing higher level policies [20]. In the present context, material resources are translated as economic funds available for climate adaptation measures and institutional resources as knowledge buildup and transfer, which previous studies [31–33] have identified as important determinants of adaptive capacity. In the mapping of organization/institutionalization of adaptation the systems for recourse allocation are analyzed at the supra-national and national scale. The interplay analysis focuses on how the national allocation of resources for institutional buildup and implementation of adaptation affectsthe national preparedness to implement the two EU strategies. The ability of various national authorities to take responsibility for adaptation is an important parameter in this analysis.

The third factor, *compatibility*, is defined as the degree of fit between the organization of an issue in international agreements and the procedures, practices, and mechanisms found in the institutional buildup of that issue at the national level [20]. In the present context, the analysis focuses on the degree of fit between the aims of climate adaptation at different scales. The aims of adaptation are further divided into the issues prioritized and the mechanisms proposed or used to guide implementation (e.g., policy instruments). In the mapping of organization/institutionalization of adaptation, thus, the aims of adaptation, including prioritized issues and main steering mechanisms, are analyzed at the various scales. The interplay analysis compares these aims of adaptation across scales, as well as analyzes the potential of the two forthcoming EU adaptation strategies to support national adaptation, in terms of complementing nationally underdeveloped issues and steering mechanisms.

The analysis is conducted in two main steps. In the first step, the current organization of adaptation is mapped for the EU's central and macro-regional approaches as is the institutionalization of climate adaptation within the two case countries. These mappings lay the groundwork for comparing the institutional buildups between scales, a comparison that, according to Ellison [7, pp. 85–86], "is crucial to building the foundation for improved strategies for addressing both climate change mitigation and adaptation." In the second step, the institutional interplay is analyzed. The framework consisting of three factors of functional institutional interplay across scales, as presented above, was used to structure both steps of the analysis [cf. 20]. Table 1 presents the overall analytical framework, the aim of organization/institutionalization assessments, and the guiding questions asked in the institutional interplay analysis.

Table 1. Framework for analyzing the organization/institutionalization of climate adaptation and the related institutional interplay [20, pp. 98–101].

Factor	Meaning	Organization/ institutionalization mapping	Institutional interplay analysis
Competence	Legal authority to implement supra-national commitments	Analyze the institutional buildup process of adaptation and the allocation of authority	How does the allocation of authority affect the possibility of implementing EU strategies? What are the potentials of the supra-national strategies to support national adaptation?
Capacity	Resources for implementing supra-national commitments	Analyze the allocation of resources needed for implementation	How does the allocation of resources affect the ability to implement EU strategies?
Compatibility	Fit between supra-national and national institutional arrangements	Analyze the aims of adaptation, divided into prioritized issues and policy instruments used	How does the compatibility of the national and supra-national aims for adaptation affect the ability to implement EU strategies? What are the potentials of the supra-national strategies to support national adaptation?

Two methods were used in this study to answer the aim and research questions asked. First, a qualitative content analysis of documentary data was used to map how adaptation is organized and what specific policies are developed, or are under development, for adaptation within the two case countries and for the two EU approaches. More specifically, the analysis focused on how adaptation is organized in terms of responsibilities of identified actors and institutional set-up, and what policies have been, or are planned to be, implemented and what issues and policy instruments that these relates to. The analyzed central EU documents included the green paper [36], the white paper [37] and the action plan [41] on adaptation, the fifth EU communication to UNFCCC [38] and reports on adaptation ordered by the EU commission [39,40]. The analyzed BSR documents included commission communications on the EU strategy for the BSR [43] and the subsequent action plan [42], a report on its implementation [45] and a research report discussing its contents [44]. The analyzed national level documents from the two case countries include national communications to the UNFCCC [47–50,53,63,64], government reports [46,51,56,60–62] and government bills [52,55].

Second, to complement the data obtained from document analysis a group interview was held at the European Commission in Brussels in June 2011. It was semi-structured [cf. 35] and involved four EU officials; three from the Directorate General Climate Action (DG Clima) and one from the Directorate General Regional Policy (DG Regio). The respondents from DG Clima were included because they are all appointed important roles in the build-up of the central EU adaptation strategy that DG Clima is responsible for. The respondent from DG Regio was included because this Directory is responsible for the European Union Strategy for the Baltic Sea Region including the forthcoming BSR adaptation strategy of which the respondent has a coordinating role. Questions centered on how the officials perceived the ability of EU strategies to complement each other and the national approaches. In the following analysis of the EU adaptation approaches the data from the group interview was foremost

used to investigate the relationship between the central and the BSR adaptation strategy, both in terms of cooperation between the two Directorates and compatibility of steering/guidance planned for in the two forthcoming strategies.

3. Supra-national Institutionalization of Adaptation

3.1. Central EU Level

The EU took the first step towards an overarching climate adaptation strategy with the green paper on adaptation [36], and a Union-wide strategy is to be launched in spring 2013. With reference to the global climate negotiations under the UNFCCC and the findings of the Intergovernmental Panel on Climate Change (IPCC), it was argued that an EU adaptation policy is needed to respond to future expected climate impacts. For example, a central strategy to "ensure proper coordination and the efficiency of policies that address the impacts of climate change" [36, p. 3] was seen as needed. Two years later, in 2009, the EU white paper entitled "Adapting to climate change: Towards a European framework for action" [37] was released. This white paper outlines an agenda for reducing climate change vulnerability in Europe by complementing national actions. This initiative is based on internationally agreed-on needs for action and follows a top–down implementation system focusing on EU coherency in adaptation [38].

The central strategy can also be regarded as a point of departure for mainstreaming climate adaptation concerns in other EU policy areas and for disseminating knowledge and best practices to actors at the national, regional, and local levels. In addition to building this knowledge base and mainstreaming adaptation, the objectives of the first phase (2009–2012) include being active in international cooperation and developing policy instruments for adaptation in Europe. No adaptation-specific policy instruments have yet been proposed within this central approach, but economic instruments that take account of adaptation concerns in private and public investments, insurance, and infrastructure projects have been discussed [37].

As discussed in the group interview, overall, the central EU climate adaptation initiative can be seen as regulated in two main ways. First, adaptation is guided by disseminating information and best practices as a form of soft control. The interviewed officials saw the process of preparing both EU strategies as a goal in itself, because it demands new cooperation, capacity building, and new channels for disseminating knowledge. Second, adaptation considerations are to be mainstreamed in EU sectoral policies to be translated into concrete policy by national governments.

In accordance with the desire to build a strong knowledge base, an informative climate adaptation website, the "European Climate Adaptation Platform (CLIMATE-ADAPT)", was launched in spring 2012 to provide an overview of impacts, sectoral EU policies, national policies, and EU-funded research. The website includes an adaptation support tool similar to those found in various EU directives, such as the Water Framework Directive. The EU is also ordering mappings of regional and national adaptation policy [cf. 39–40].

The climate change impacts presented as most critical in the EU green paper are droughts, floods, reduced access to drinking water, ecosystem degradation, health impacts, and population displacement. The most vulnerable sectors are seen to be agriculture, forestry, fisheries, tourism, health, and

insurance [36]. The EU is described as having a prominent role to play regarding issues that cross national borders and in coordinating climate adaptation in sectors that are closely integrated through EU markets or policies, such as the fisheries, agriculture, biodiversity, water, and energy sectors [41]. As stated in the white paper [37], other prioritized issues are infrastructure and development aid.

3.2. Macro-regional EU Level

The European Union Strategy for the Baltic Sea Region was adopted by the European Council in 2009 and is the first of thirteen macro-regional EU strategies. This strategy was developed to address the environmental degradation of the Baltic Sea (targeted by the development of a Baltic Sea-wide climate adaptation strategy) as well as the divergent development paths of its eight EU member states [42]. In contrast to the central strategy, the BSR strategy argues less for mainstreaming of global policy. Instead, it appears as though pronounced adaptation needs emerge from macro-regional climate vulnerability experienced in the BSR. However, the entire BSR strategy is part of the macro-regional policy development process in the EU, which aims to build strong regions to facilitate the mainstreaming of EU policy. This aim is also mirrored in the BSR strategy, which emphasizes encouraging solidarity among BSR nations and supporting adaptation in the most vulnerable and least economically strong areas [43]. The interviewed officials also emphasized both solidarity and the dissemination of best practices as key drivers for implementing both EU adaptation policies.

Compared with the central initiative, the BSR strategy does not suggest any new institutional setup to coordinate climate adaptation, nor does it propose any additional funding for governing the issue [43]. Instead, the strategy is to be implemented through existing networks such as the Helsinki Commission (HELCOM), the Council of the Baltic Sea States (CBSS), and Nordic Dimension (ND) [42,44]. As explained by interviewed officials, this setup also makes it possible to influence non-EU states (e.g., Russia) regarding adaptation issues, which is seen as important for successful environmental management. However, the division of responsibility for specific issues or concerns is still unspecified.

Inputs to the implementation of the climate adaptation strategy are to be provided by actors currently working in the above networks, and through research projects funded by the EU Baltic Sea Region Programme (BSRP) [45]. The BSR strategy appears less focused on influencing national policy since it places more emphasis on guiding local and regional policymakers than on the EU-wide strategy. This was also noted by the interviewed officials, who argued that the BSR strategy can complement the central strategy by giving more regionalized examples of best practices.

The BSR strategy focuses on four main interdependent challenges—*i.e.*, sustainable development, economic prosperity, accessibility, and regional security—comprising fifteen priority areas. The strategy pays specific attention to environmental issues [43]. According to the strategy, the Baltic Sea is a fragile ecosystem and the impacts of climate change are increasing the vulnerability of its natural systems. This focus on ecosystems follows on the work of HELCOM and refers to human systems, primarily through sectors such as fisheries, tourism, and agriculture [42]. The strategy mentions several expected effects of climate change: changed precipitation patterns leading to increased runoff and lower salinity, and increased water temperatures leading to changed circulation and water balance. Impacts mentioned in the strategy are effects on species living in the sea mediated

by changes in how they interact, breed, and are distributed, and effects on the biota and biological processes in the sea [45].

4. Analysis and Discussion: National Adaptation and Institutional Interplay

This section analyzes the institutional interplay between the two EU-level strategies and the two case countries in light of the three factors of competence, capacity, and compatibility.

4.1. Competence

4.1.1. Sweden

In the late 1980s, the Swedish Environmental Protection Agency made an early start in discussing climate adaptation measures in response to climate change impacts, even though future effects were seen as too uncertain to merit initiating measures [46]. In subsequent years, Swedish climate policy strongly emphasized mitigation. However, climate vulnerability was identified as an up-and-coming issue and was initially developed through local Agenda 21 offices [47]. Sweden's institutionalization of climate adaptation mainly follows a bottom–up approach with several municipal and private initiatives. For example, in 2005, before any relevant national regulations were instituted, some municipalities changed their building codes in response to expected flood risks, and a new refining strategy was formulated in the forestry sector [48]. Despite the early consideration of future climate change impacts in Sweden [46,49], no specific national regulation of climate adaptation was instituted until a few years ago. Up to that point, the central level focused only on investing in sectoral vulnerability assessments, climate research, and developing support systems for municipalities [50]. However, after the 2007 release of the national vulnerability assessment [51], a few proposed national adaptation measures were developed and later implemented. In 2009, the government implemented two concrete measures. The first was to create adaptation coordinators at all 21 Swedish county boards to coordinate municipal adaptation initiatives. The second was changes in the Planning and Building Act (2010:900), stating that adaptation concerns should be considered in municipalities' comprehensive and detail planning. Both of these measures followed the direction identified in the 2009 government bill [52] stating that existing adaptation work in Sweden needs to be strengthened at the local level. For the coordination of adaptation in Sweden, the regional level has been assigned an important role through the creation of the adaptation coordinators. No national authority has been provided with the main responsibility for climate adaptation in Sweden.

4.1.2. Finland

In contrast, Finland's institutionalization of climate adaptation can be described as more top–down in nature. Work on a National Adaptation Strategy (NAS) started with the Ministry of Agriculture and Forestry as the coordinating partner in 2003 in response to a parliamentary question [53]. A task force consisting of representatives from various ministries led the work, and each administrative sector conducted an assessment that was later used to guide the strategy, which was published and implemented in 2005. In addition, general climate and socio–economic scenarios were formulated for the whole country. A strong motivation for formulating the NAS in Finland seems to have been the

Finnish commitment under article 4 of the UNFCCC [54] stipulating that all parties should produce and implement national mitigation and adaptation programs [55].

Finland began implementing the NAS in 2005 with the main aim to "strengthen and increase Finland's adaptive capacity" [55, p.10]. Through the NAS, following a traditional system of management by objectives including goals, indicators, and follow up systems, each administrative sector has taken a clear direction in deciding what to adapt to and how. Goal implementation is divided between sectors and evaluated centrally. A 2009 evaluation report on NAS implementation concluded that the need for adaptation was somewhat recognized by decision makers, that adaptation measures were often identified, and that some measures had been launched [56]. However, the report also argued that it was important to reinforce implementation of the strategy, which is to be revised in 2013. For example, the regions are seen as interpreting the strategy's goals quite disparately and the central level is seen as providing municipalities with inadequate funding and insufficiently clear policy instruments [57].

4.1.3. How Does the Allocation of Authority Affect the Possibility of Implementing the Two Strategies?

As is apparent in the above mapping, the institutionalization of climate adaptation in the two case countries was initiated before the two overarching EU adaptation strategies were introduced, at which time several national adaptation policies had already been implemented or were under development. This is not uncommon in the case of EU cooperation: supra-national strategies often aim to support existing member state developments.

However, these developments can pose issues when the EU direction somewhat opposes the structure of national policy. On the one hand, in terms of allocation of authority in Finland, which applies a more centralized implementation system, it will generally be straightforward to implement the EU adaptation strategies, particularly at the national level. The strong role of the national government makes it less problematic to transfer priorities from the supra-national to the national level, although problems persist in steering the sub-national levels. On the other hand, in countries with a more decentralized system of authority, such as Sweden, implementing EU level policies is further complicated by dispersed authority. The institutionalization of adaptation in Sweden places higher demands on actors at sub-national levels to translate EU priorities into action. Due to the greater general ease of implementing EU policy through centralized national systems, the EU strongly advocates the usefulness of implementing national adaptation strategies. This can be exemplified by the European Commission's frequent references to a report of the Partnership for European Environmental Research (PEER), which visualizes countries with a national strategy as green and without as red [58]. However, two constraints can be identified, if any redirection of national institutional buildup in line with the proposed EU strategies were to take place.

First, such large investments related to redirecting national institutional buildup could influence functioning institutional settings, creating policy complexity for involved actors at sub-national levels and taking economic resources away from implementation—with doubtful added value for involved actors—especially for countries with a bottom–up allocation of authority such as Sweden. Sweden already possesses three formal institutional layers identified as important for implementing climate adaptation, i.e., the national, regional, and local governmental levels. The addition of a macro-regional

and a central EU layer may not make it easier to know what guidelines to follow, especially since the guidelines are not, and are unlikely to become, more specific at the EU level. Thus, to complement national action, and avoid some policy complexity, support of the EU level to sub-national adaptation efforts needs to be acknowledged, where through different regional programs, regional and local adaptation strategies are pursued [59].

Second, both the group interview and the document analyses revealed that the connection between the EU's central and macro-regional approaches is very unclear. As presented in section 3, the two EU strategies operate at different levels of decision-making. The central strategy takes the standard EU regional perspective, which, in itself, is not new. The BSR strategy, on the other hand, takes a new macro-regional governing perspective intended to complement the central level. The role and mandate of this new governing level remain vague. Since the two EU approaches characterize two different forms of authority, it is far from obvious how to build a national institutional structure corresponding to both these developments.

4.2. Capacity

4.2.1. Sweden

In Sweden, some general but no specific funds are allocated for implementing climate adaptation, which would be difficult in any case, since no specific overarching national goals exist to guide such allocation. In terms of resources for adaptation generally, the national government has invested in various types of knowledge buildup and coordination. The first major finances for coordination were started to be allocated to county boards in 2009 to coordinate municipal adaptation initiatives. These funds are allocated on a yearly basis and have been set to approximately EUR 3 million per year. These finances have in some cases also financed adaptation projects in municipalities, for example in the county of Västerbotten. The major governmental venture since 2009 has been to commission the Swedish Meteorological and Hydrological Institute (SMHI) to create a national center for collecting and disseminating knowledge of climate vulnerability and adaptation, an effort that started in 2012 [60]. In connection with this national center, and in cooperation with other sectoral authorities, the SMHI also hosts an adaptation information portal to provide information to various actors about climate change impacts and adaptation. In addition to this venture, the government has also invested in knowledge buildup concerning vulnerability to climate change in specific national sectoral authorities as a mainstreaming activity. Risk and vulnerability analyses have examined, for example, hydropower dams, airport runways, energy grids, planning and building, the stability of selected river banks, environmental management, and health considerations [61]. Ongoing activities related to adaptation within national sectoral authorities include flood and landslide mapping, an impact analysis of flooding in Lake Mälaren, knowledge buildup and information dissemination concerning the effects of climate change on drinking water and forest management, and the development of a new national elevation model through airborne scanning. Municipalities can also apply for funds from the Swedish Civil Contingencies Agency to take preventive actions in areas at risk of natural disaster, though the yearly allocation of funds for this purpose is set to only approximately EUR 4 million in total [60].

4.2.2. Finland

In Finland, the NAS has been implemented through the normal planning and monitoring of each administrative sector, as mentioned above. This mainstreaming approach has also meant that no additional resources, financial or economic, have been available for the implementation of climate adaptation. This may have affected the degree to which adaptation has been mainstreamed, given that the overall level of adaptation is still considered fairly low [56]. Importantly, the national government has made no additional resources available to the regional authorities or municipalities for implementation purposes.

Adaptation research is considered a priority in terms of improving the knowledge base for climate adaptation, as there are admittedly many uncertainties concerning the impacts of climate change and of adaptation measures [55]. Nationally coordinated climate change research, particularly policy-relevant adaptation research, has been undertaken in Finland since the 1990s, most recently as part of the ISTO program [27]. In the ISTO program, government research institutions work under the auspices of the ministries engaged in adaptation-relevant research projects, with the intention of feeding research findings directly into the ministries' work. Despite these coordinated efforts, even the ISTO program has suffered from a lack of adequate funding [62]. An additional knowledge resource is the national climate information portal, which provides information to municipal planners and stakeholders, citizens, and others concerned about climate change.

4.2.3. How Does the Allocation of Resources Affect the Ability to Implementing the Two EU Strategies?

There are some similarities in how Finland and Sweden allocate their resources for climate adaptation. An example presented above is that of investments in building a stable knowledge base through supporting sectoral vulnerability assessments and broader national knowledge hubs targeting actors at various levels. However, differences also exist, for example, in how implementation is supported by the national government. At a general level, the Finnish government has so far put the most effort into the institutional buildup of climate adaptation in terms of setting goals and identifying appropriate measures, and less emphasis is placed on financing and coordinating implementation. The Swedish government, in contrast, has spent less on setting national adaptation goals and more on supporting municipal implementation through coordinating and to some extent financing such efforts. Another difference is in how responsibility for adaptation is divided between the national sectoral authorities. In Finland, one authority, the Ministry of Agriculture and Forestry, has been assigned a coordinating role for adaptation, advocating an approach of mainstreaming. In Sweden, no single authority has been given this task; instead, networks of authorities are coordinating specific issues related to climate change vulnerability.

The differences in the national allocation of resources between Finland and Sweden will likely give rise to different opportunities in implementing the two EU adaptation strategies. At a general level, it will be easier for Finland to translate the EU goals into national goals, both because one single authority is coordinating the related efforts and because the existing goals are already quite general in character. In Sweden, national goals will first have to be set to be able to implement EU goals, but this will be challenging if no authority takes the lead in this work. In terms of implementation, on the other

hand, Finland will have to find ways to convince local governments of the usefulness of prioritizing the implementation of possibly even wider-ranging EU goals. Regional adaptation coordinators who could be used for discussing and coordinating such priorities among local governments has already been established in Sweden, which will probably make this challenge less complicated.

4.3. Compatibility

4.3.1. Sweden

The climate adaptation issues prioritized at an early stage in Sweden were safety of hydropower dams and effects on the forest industry. It was stated early on that the forest industry would have to adapt its cultivation methods to deal with climate change impacts, such as increased risk of insect and fungus attacks [47,49]. Adaptation measures suggested in early 2000 were changed dimensions of hydropower dams and of water and sanitation pipes. More recently this priority has shifted to a focus on building processes and physical planning [48], exemplified at the central level through changes in the Planning and Building Act and at the regional level through the guidance that county boards are giving municipalities.

Except for the Planning and Building Act, no developed strategies specifically address the policy instruments used to direct climate adaptation measures in Sweden. However, several previous strategies developed for other issues might also be useful for guiding adaptation. Many of these strategies were developed for guiding disaster risk reduction through laws, directives, and instructions that might also be useful for guiding reactive adaptation issues such as managing flood impacts or chemical spills into freshwater ecosystems. Policy instruments guiding anticipatory adaptation are much weaker in character and focus on mainstreaming though municipal and sectoral responsibilities and through disseminating information [60].

4.3.2. Finland

Issues prioritized early on in Finland also concerned impacts on forestry and agricultural production [63]. In 2001, it was stated that the agriculture, forest, watercourse, energy, and transport sectors would need to institute climate adaptation measures to prevent impacts on biodiversity, forest and agricultural production, and buildings and infrastructure [64]. Since then, the focus has shifted to include urban issues and especially urban water management. A 2009 evaluation of the national adaptation strategy concluded that the sector that had advanced the most in implementing adaptation measures was water resource management, while less progress had been made in the fisheries, reindeer and game management, and biodiversity sectors [56].

The systems for guiding climate adaptation in Finland can be described as more or less top–down. As presented above, the national adaptation strategy follows a traditional system for national management by objectives, including goals, indicators, and follow up systems, coupled with the traditional bureaucratic tradition of government in Finland [65]. Implementation of the adaptation goals is clearly divided between sectors, which are later evaluated at the central level. The NAS states that all sectors should implement adaptation goals using mechanisms such as physical planning, environmental risk assessments, environmental management systems, laws, and the principles of risk

management [55]. When it comes to specifically directing adaptation below the national level, however, no relevant policy instruments exist. Other existing steering mechanisms, such as legislation on land use and the building can be used for pursuing adaptation. However, the efficacy of that depends on the extent to which adaptation has been mainstreamed in specific Ministries.

4.3.3. How Does the Compatibility of National and Supra-national Guidance Affect the Ability to Implement EU Strategies?

Both of the forthcoming EU climate adaptation strategies can be regarded as ways to strengthen adaptation by complementing national action. Therefore, to analyze the constraints and opportunities presented by the fit between the national and supra-national approaches to building a functional institutional interplay, this section discusses the level of compatibility of these approaches. As seen in the above mappings, though Finland and Sweden have different systems for prioritizing adaptation in the form of goals and indicators, the two case countries have prioritized similar issues (*i.e.*, urban planning and building) and both have underdeveloped (or untested) policy instruments for enabling proactive adaptation. To complement national action, thus, the two forthcoming EU strategies should preferably contribute with input to develop useful policy instruments for anticipatory adaptation and for complementary prioritized issues. In the following discussion, the former instruments are treated as a constraint to building a functional institutional interplay while the latter are treated as an opportunity.

What is obvious from the above mappings is that both EU approaches are surrounded by very unclear policy instruments for guiding climate adaptation. The 2009 white paper suggests two principal ways for the central EU strategy to guide national adaptation. These include first building a shared European knowledge base for adaptation, which is already under development in the two case countries, and then mainstreaming climate adaptation through EU sectoral policies. In connection with the latter, it is suggested that adaptive concerns should be addressed by delimited sectoral policies such as the Floods Directive (FD) and the Water Framework Directive (WFD). However, few or no direct policy instruments suggest how to do this, as also noted in previous studies [66]. A risk of this way of directing future action is that implementation will place a greater emphasis on the format (e.g., when to set objectives, what to report, and how to formulate plans) than on how to direct action towards specific goals. Such a criticism has previously been leveled at, for example, the implementation of the WFD [67,68]. Mapping adaptation policy in the two case countries indicates that clear policy instruments and systems for financing implementation are more essential in managing adaptation than are new working methods. Moreover, the main aim of the forthcoming macro-regional EU adaptation strategy is also the mainstreaming of adaptation, though so far mainly in existing BSR institutions. Since no steering systems are presented in the macro-regional strategy, it is difficult to analyze exactly how the strategy will complement national policy in the two case countries. In relation to mainstreaming as a principle in the EU, however, previous studies find scant evidence that such policy integration would be a successful principle of vertical policy implementation [69,70].

However, in comparing the national- and the EU-level, one aspect related to the contextual nature of climate change vulnerability stands out as more problematic for functional institutional interplay than the one presented above. The central EU strategy is developing goals for highly contextualized issues such as city planning and building, issues considered too contextualized even for national-level

guidance in the two case countries. The handling of such contextual aspects in the EU strategies is so far underdeveloped, and is an important issue to resolve in building a functional institutional interplay of adaptation policies in Europe.

Related to the prioritized issues, however, at least one nationally underdeveloped issue has been given priority in the two forthcoming EU strategies, i.e., biodiversity which is most apparent in the macro-regional approach. Supporting with input and coordination the management of this transnational issue within and between nations could create a clear opportunity for the functional institutional interplay of climate adaptation in Europe.

5. Conclusions

This article has analyzed constraints and opportunities present in the new landscape of institutional interplay between the organization of adaptation in two forthcoming EU climate adaptation strategies and the national institutionalization of adaptation in the two case countries, Finland and Sweden. The first analyzed EU strategy takes a classic central EU perspective while the second takes a new macro-regional Baltic Sea perspective. As discussed here, the two EU approaches are partly overlapping. Though the Baltic Sea approach still lacks a precise direction and the central approach is broader in scope, both approaches touch on shared climate change vulnerabilities and partly target the same member states. This vagueness in the approach and focus of the EU level strategies can enable the Member States to pursue the kinds of adaptation strategies that they consider most suitable to them. However, the lack of specific macro-regional goals also runs the risk of non-coordinated action and inefficient use of resources. On the whole, how the two EU approaches are to complement each other remains unclear, even though the macro-regional strategy focuses more on biodiversity issues and the central approach more on issues historically marked by strong EU cooperation. Once the EU level strategy has been finalized and published, it will be possible to see to what extent significant policy conflicts arise.

The two analyzed case countries have institutionalized climate adaptation in partly different ways, which affects the degree to which it will be possible to incorporate the supra-national policies. Finland has taken a more top–down approach to adaptation, including national goals, followup systems, and a responsible national agency, but lacks policy instruments governing the implementation and coordination of adaptation at a sub-national level. Sweden has taken a more decentralized approach: it has not established clear national adaptation goals or a responsible national agency, but has implemented adaptation coordinators at the regional level and implemented support systems for local governments. At a general level, it will be easier for Finland to incorporate EU goals through its top–down system but likely more difficult to convince sub-national actors of the usefulness of prioritizing the implementation of possibly even wider-ranging EU goals. In Sweden, national goals must be set to implement EU goals, which will be challenging without a leading national authority, but it will probably be easier to discuss the implementation of EU goals due to the sub-national coordination of adaptation in Sweden.

The results of this study indicate four constraints and one opportunity in building a functional vertical institutional interplay of climate adaptation between the analyzed scales in the BSR. The constraints relate to the following: risks of policy complexity for sub-national actors due to new

and unclear governing levels of EU, an unclear relationship between the two EU approaches, an overly general approach to targeting contextualized climate change vulnerabilities in member states, and general lack of strategies to steer adaptation at both the EU and national levels. However, the results also indicate opportunities related to the possible incorporation of issues related to biodiversity in the national management of adaptation in Sweden and Finland. The latter are under-developed in the current institutionalization of adaptation.

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Conflict of Interest

The authors declare no conflict of interest.

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